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## Notes on some late summer butterflies of Bulgaria with a short zoogeographical analysis

(Lepidoptera, Hesperioidea & Papilionoidea)

by

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### Introduction

This work is based on the observations accumulated during expedition of the authors in the middle of September 1994 in W and S Bulgaria.

Investigated areas were the following: (1 – FM39) 13.IX.94 – SW Bulgaria: Struma Valley: Zemen Gorge: surroundings of Skakavitsa Stop: 500–700 m; (2 – FM72) 15.IX.94 – SW Bulgaria: Struma Valley: Kresna Gorge: 300–400 m; (3 – FM96) 17.–18.IX.94 – SW Bulgaria: Rila Mts: Tcherni Ridge: 1200–2400 m; (4 – LG70) 20.IX.94 – S Bulgaria: E Rhodopi Mts: Arda Valley: Sredna Arda; (5 – LG70) 21.IX.94 – S Bulgaria: E Rhodopi Mts: Zvezdelina; (6 – LF89) 21.IX.94 – S Bulgaria: E Rhodopi Mts: Krumovgrad; (7 – MG01) 22.IX.94 – S Bulgaria: E Rhodopi Mts: Arda Valley: Kulich – “Iron Bridge”

The late summer butterfly fauna can be divided into three groups. The first one consists of monovoltine species whose flight period begins in early summer (June) and lasts till the end of September to October. This group includes all the satyrins and some species of *Lycaenidae*: *T. betulae*, *F. quercus*, *P. coridon*. The second group is presented by the species overwintering as imago. It includes all the *Nymphalinae*, and also *L. celtis*, *I. lathonia*. The third group comprises polyvoltine species. Many species of this group fly till the autumn (end of October to November) and appear to be some of the most frequent late summer and autumn butterflies. Generally, in the investigated areas butterflies were encountered mainly in deep gorges and river valleys where the flowering grassy plants are still preserved.

For the first time in Bulgaria it was registered the third, autumn generation of *Pontia chloridice* (HÜBNER, [1813]).

### List of species, localities and distributional types

In Table 1 localities are given with numbers (1, 2, 3, 4, 5, 6, 7); “V” means voltinism, where “M” is monovoltine, “B” is bivoltine and “P” is polyvoltine species; the presence in the investigated locality is marked with “+” and DT means distributional type.

Also the following abbreviations are used: Mi (Middle), Cosm (Cosmopolitan), Hol (Holarctic), Pal (Palearctic), Si (Siberian), Md (Mediterranean), Eu (European), Balk (Balkan), An (Anatolian), Ca (Caucasian), Lev (Levantine), Ir (Iranian), Kaz (Kazakh), Or (Oriental).

Table 1: List of species, voltinism, localities and distributional types.

Taxon	V	1	2	3	4	5	6	7	DT
<b>Hesperiidae</b>									
<i>Carcharodus alceae alceae</i> (ESPER, [1780])	P							+	EuAnLev
<i>C. lavatherae tauricus</i> REVERDIN, 1915	B								BalkAnCalrKaz
<i>C. flocciferus</i> (ZELLER, 1847)	B								EuAnKaz
<i>Spialia orbifer</i> (HÜBNER, [1823])	P								EuAnLev
<i>Pyrgus armoricanus persicus</i> (REVERDIN, 1913)	B								BalkAnCalrKaz
<b>Papilionidae</b>									
<i>Iphiclides podalirius podalirius</i> (LINNAEUS, 1758)	P								EuSi
<i>Papilio machaon syriacus</i> ELLER, 1936	P							+	EuAnLev
<b>Pieridae</b>									
<i>Leptidea sinapis sinapis</i> (LINNAEUS, 1758)	P								EuSi
<i>Colias crocea</i> (FOURCROY, 1785)	P							+	WPal
<i>C. sareptensis</i> STAUDINGER, 1871	P								EuAnlr
<i>Pieris brassicae brassicae</i> (LINNAEUS, 1758)	P							+	WPal
<i>P. krueperi krueperi</i> STAUDINGER, 1860	P								BalkAnCalrKaz
<i>P. rapae rapae</i> (LINNAEUS, 1758)	P							+	WPal
<i>P. mannii mannii</i> (MAYER, 1851)	P								Balk
<i>P. ergane ergane</i> (GEYER, [1828])	P							+	Balk
<i>P. napi napi</i> (LINNAEUS, 1758)	P							+	Hol
<i>Pontia edusa</i> (FABRICIUS, 1777)	P							+	EuAnLev
<i>P. chloridice chloridice</i> (HÜBNER, [1813])	P								BalkAnCalrKaz
<b>Lycaenidae</b>									
<i>Lycaena phlaeas phlaeas</i> (LINNAEUS, 1761)	P							+	Hol
<i>L. dispar rutila</i> (WERNEBURG, 1864)	B								EuAnKaz
<i>L. virgaureae virgaureae</i> (LINNAEUS, 1758)	M								EuSi
<i>L. tityrus tityrus</i> (PODA, 1761)	P								EuSi
<i>Thecla betulae betulae</i> (LINNAEUS, 1758)	M								EuSi
<i>Favonius quercus quercus</i> (LINNAEUS, 1758)	M								EuAnLev
<i>Leptotes pirithous</i> (LINNAEUS, 1767)	B							+	Md
<i>Plebeius argus aegidion</i> (MEISNER, 1818)	B								EuAnlr
<i>P. argyrognomon argyrognomon</i> (BERGSTRÄSSER, 1779)	M								Eu
<i>P. agestis</i> ([DENIS & SCHIFFERMÜLLER], 1775)	P							+	EuSi
<i>P. anteros anteros</i> (FREYER, [1838])	B							+	BalkAn
<i>Polyommatus dorylas dorylas</i> ([D. & S.], 1775)	B								EuAnKaz
<i>P. thersites</i> (CANTENER, [1835])	B								WPal
<i>P. icarus</i> (ROTTEMBURG, 1775)	P							+	Pal
<i>P. bellargus</i> (ROTTEMBURG, 1775)	M								EuAnlr
<i>P. coridon coridon</i> (PODA, 1761)	M								EuAnKaz
<b>Nymphalidae</b>									
<i>Libythea celtis celtis</i> (FÜESSLY, 1782)	M								Md

Taxon	V	1	2	3	4	5	6	7	DT
Hesperiidae									
<i>Kirinia roxelana</i> (CRAMER, [1777])	M								EuAnLev
<i>Pararge aegeria tircis</i> (GODART, 1821)	B								EuAnKaz
<i>Lasiommata megera transcaspica</i> (STAUDINGER, 1901)	P							+	EuAnLev
<i>L. maera</i> (LINNAEUS, 1758)	B								Md
<i>Coenonympha pamphilus</i> (LINNAEUS, 1758)	P							+	WPal
<i>Maniola jurtina phormia</i> (FRUHSTORFER, 1909)	M							+	BalkAnCalrKaz
<i>Hyponephele lupina lupina</i> (COSTA, [1836])	M								Eu
<i>Erebia cassioides macedonica</i> BURESCH, 1918	M								Balk
<i>E. pronoe fruhstorferi</i> WARREN, 1933	M								Balk
<i>Melanargia galathea satnia</i> FRUHSTORFER, 1917	M								BalkAnCalrKaz
<i>Hipparchia fagi fagi</i> (SCOPOLI, 1763)	M								Eu
<i>H. syriaca syriaca</i> (STAUDINGER, 1871)	M								EuAnLev
<i>H. aristaeus senthes</i> (FRUHSTORFER, 1908)	M								BalkAn
<i>H. semele semele</i> (LINNAEUS, 1758)	M								Eu
<i>H. statilius</i> (HUFNAGEL, 1766)	M							+	Md
<i>H. fatua fatua</i> (FREYER, [1844])	M								EuAnLev
<i>Chazara briseis meridionalis</i> (STAUDINGER, 1886)	M								AnMiOr
<i>Arethusana arethusana</i> ([DENIS & SCHIFFERMÜLLER], 1775)	M								EuAnKaz
<i>Brintesia circe</i> (FABRICIUS, 1775)	M							+	EuAnIr
<i>Pseudochazara anthelea amalthea</i> (FRIVALDSZKY, 1845)	M							-	Balk
<i>Limenitis reducta herculeana</i> STICHEL, [1908]	B							+	EuAnLev
<i>Vanessa atalanta atalanta</i> (LINNAEUS, 1758)	B								Hol
<i>V. cardui</i> (LINNAEUS, 1758)	P							-	Cosm
<i>Aglais urticae turcica</i> (STAUDINGER, 1861)	B							-	BalkAnCalrKaz
<i>Polygonia c-album</i> (LINNAEUS, 1758)	B								EuSi
<i>Argynnis pandora pandora</i> ([D. & S.], 1775)	M							+	EuAnLev
<i>Issoria lathonia</i> (LINNAEUS, 1758)	B								Pal
<i>Boloria dia</i> (LINNAEUS, 1767)	B								EuSi

## Zoogeographical analysis

The late summer butterfly fauna consists of different distributional types, which fall into 15 groups. The Euro-Anatolian-Levantine group is predominant (17.5%). In the monovoltine species this group comprise 20.8% (highest percentage), in the bivoltine species – 5.9%, and in the polyvoltine – 22.7% (again highest percentage). In the bivoltine species the group of Euro-Anatolian-Kazakh distributional type is prevalent (23.5%). The group of Balkan endemics comprise 7.9% in general, 12.5% of the monovoltine species, absent in the bivoltine, and 9.1% of the polyvoltine species.

The species with the Northern distributional type (Cosm + Hol + Pal + WPal + EuSi + EuAnKaz + EuAnIr + EuAnLev + Eu) are prevalent (69.8%). This percentage is lowest in the monovoltine (62.4%), somewhat high in the bivoltine (64.8%), and highest in the polyvoltine species (81.7%).

In the species with Southern distributional type Balkan-Anatolian-Caucasian-Iranian-Kazakh group (11.1% in general) is predominant, while the group of Balkan endemics has a highest percentage (12.5%) only in the monovoltine species.

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